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a substance much resembling gum-tragacanth, which, when added to the jelly, makes it harden. This milk-jelly is easily digested, its taste is perfect, and it may be preserved, even in the air, for ten days. The inhabitants of the north of Sweden preserve the precious microbe, caring for it as the savages care for their fire. They put it in all the milk they wish to preserve, as such milk is better and more easily obtained, in every case, than the condensed milk of the factories of Cham and Montreux. Alcoholic fermentation is produced in milk when sown with koumiss, or with the fungus of kéfir, a favorite Russian drink. This curious ferment is a combination of two distinct ferments, — a yeast analogous to that of wine, and a microbe, *Dispora caucasia*. These two organisms live together in perfect harmony, and for a common end, — the production of a gaseous, piquant, agreeable, and, above all, healthful beverage. The kéfir is especially valuable as a food for infants and invalids. Several physicians of Geneva intend to make trials of it, and we are in hope of being soon enriched by the addition of a new and valuable hygienic food.

THE MERIDIAN CONFERENCE.¹

At Tuesday's meeting, Oct. 14, the resolution to reckon longitudes east and west from Greenwich to plus and minus 180° was advocated by Professor Adams, Capt. Evans, and Gen. Strachey, of Great Britain, and by Mr. Rutherford; the very strong point being urged in its favor, that the jump in longitude from + 180° to - 180° occurs in the Pacific Ocean, where the local time now jumps twenty-four hours, — and it must do this somewhere, — and hence it will cause no change from the present practice among navigators, or in the date of the present local time of any part of the earth; and the relation between the local date and hour of any place, and the universal time of the Greenwich meridian, will always be correctly given by the simple formula, $L.T. = U.T. + \lambda$, λ being the longitude expressed as above. After a short recess for informal discussion, the resolution was adopted by a small majority.

A resolution was then introduced, that the conference propose the adoption of a universal day for all purposes for which it may be found convenient, and which shall not interfere with the use of local time where desirable.

The delegate from Italy offered as a substitute the resolution of the geodetic conference at Rome, which proposed a universal day of twenty-four hours, beginning at Greenwich, mean noon; i.e., the present astronomical day, twelve hours later than the civil.

Mr. Allen here read a paper upon the needs and conveniences of the railroads and telegraphs, advocating local times differing whole hours from each other, and introduced a resolution that local time be held to mean that of the nearest meridian situated some whole number of hours from Greenwich; but, after some discussion as to the competence of the conference to go so far into details, he withdrew it.

The resolution to adopt the recommendation of the

Roman conference was lost, and the original resolution was adopted by a large majority.

It was then proposed that the universal day be a mean solar day, to begin for all the world at the moment of midnight of the initial meridian, coinciding with the beginning of the civil day and date of that meridian, and to be counted from zero up to twenty-four hours.

To give time for informally considering this, and for the secretaries to revise and publish in English and French the two-days' proceedings, the conference adjourned till Monday, the 20th.

At the meeting on Monday, the delegate from Spain proposed the adoption of a universal day corresponding to the local day of Rome, 'on account of classic historical associations,' and apparently with the idea that somehow the epoch of the Gregorian calendar would be changed by adopting the Greenwich day.

Professor Adams and Commander Sampson pointed out the confusion that would arise from reckoning time from one meridian, and longitude from another; and, after further discussion, all the amendments were voted down, and the original resolution, recommending a universal day beginning at midnight of the prime meridian, and counted from zero to twenty-four hours, was adopted by a considerable majority. Another resolution was passed by a large majority, expressing the hope of the conference that the astronomical and nautical days may soon be arranged everywhere to begin at midnight.

Mr. Janssen introduced a resolution expressing the hope of the conference that all nations will make a study of the advantages of dividing the day and circular measure, wherever used, into four quadrants, with decimal division of quadrant. After considerable discussion, this was adopted with a slight modification in the phraseology.

Gen. Strachey offered a resolution recommending that all local times differ, by some multiple of ten minutes, from that of the prime meridian. Without acting on this, the conference adjourned till Wednesday.

COTTERILL'S APPLIED MECHANICS.

Applied mechanics: an elementary general introduction to the theory of structures and machines. By JAMES H. COTTERILL. London, Macmillan, 1884. 20 + 584 p. 8°.

THE appearance of a new book by the distinguished lecturer on applied mechanics at the Royal naval college, the organization of which he has done so much to forward, and the prosperity and success of which are ascribed so largely to Professor Cotterill, is an event likely to interest all who are engaged in similar lines of work. The opportunity is not open to the writer upon the subject of applied mechanics to produce as completely novel a work as was the earlier book by the same author, — 'The steam-engine considered as a heat-engine.'

¹ Continued from p. 378.

The work is professedly based upon Rankine's treatise, and is supplemented by a large amount of other, and some new, matter. The plan of the work is in some respects unusual. Its first part is devoted to the statics of structures, the second to the kinematics of machines, the third to the dynamics of machines, the fourth to the strength and stiffness of materials, and the fifth to the transmission and conversion of energy by machines.

In part i. but little will be found to demand special notice. The methods of graphical statics are adopted throughout, and are applied in succession to the simplest and the more complex cases. The straining action of a load applied to a structure is considered in several chapters; shearing, bending, and twisting being taken up in order. Cases of frames having redundant parts, and the action of a travelling load, are given with propriety considerable space. In part ii. we find the author following Rankine in an innovation upon the standard plan of text-books on mechanics as hitherto constructed. Professor Cotterill here introduces the study of the kinematics of machines, — a subject not often considered to form a part of this general division of the theory of engineering, and only treated of, up to the present time, to any considerable extent, in separate works, as in Willis's and in Reuleaux's well-known works. Rankine introduced this subject, under the title 'Geometry of mechanism,' into his 'Machinery and mill-work,' and introduced it also in his 'Applied mechanics.' This author has introduced to a limited extent the nomenclature and methods of the latest of the great masters of this division of the science of engineering, Professor Reuleaux, and has thus brought the matter fully up to the time. A feature of the work to be noticed here, perhaps even more than elsewhere, is the selection of mechanism familiar to the engineer, and where possible of those in common use, in illustration of the principles to be explained. Part iii., on the dynamics of machinery, as would naturally be expected, occupies a large amount of space. It opens with a statement of the 'principle of work,' shows how resistances are determined in common cases, defines energy, illustrates the methods of its transfer in machines, and considers the kinetic form of energy as met with in freely-moving bodies and in machines. A chapter is devoted to the dynamics of the steam-engine, and especially to the graphical representation of the variation of effort and of energy at the crank. All of this work is interesting and valuable; and the greater part of it is here for the first

time, so far as the writer is aware, introduced into the literature of the schools.

The study of cases of incomplete constraint and of straining actions in machines gives the author an opportunity to introduce the principle of momentum and other dynamical principles, and to illustrate their application by the analysis of the governors and other familiar cases. Part iv., on the strength of materials, occupies more space than any other division of the book. Impact, compound stresses, and flow are as fully treated as the limits of the book permit, and more so than is usual in treatises of this character. The work of Professor James Thomson on the flow of solids is described, and the experiments of Tresca and of Wohler are cited.

The volume includes in its last division, part v., a discussion of the principles involved in the transmission of energy by fluids, and of its transformation. The flow of fluids, the action of machines driven by them, and the elementary principles of thermodynamics, are here studied.

An excellent feature of the book is its references to works in which the subjects treated are more fully developed by accepted authorities. Examples are introduced at the end of each chapter which are doubly interesting as illustrating the special case there treated, and as exhibiting applications occurring in the engineer's practice. The engravings are numerous, and, in all cases in which it is possible, drawn from working machines and structures common in engineering.

The work as a whole is one which will not only increase the reputation of its author, but will earn for him the thanks of many instructors in technical schools who have long been hoping for such a treatise as will permit them to discard works, which, valuable in their day, are now left behind in the forward movement of the profession of engineering and of science.

SCIENTIFIC BUTTER-MAKING.

A manual for scientific butter-making. By W. H. LYNCH. Printed by order of the legislative assembly. Toronto, Robinson pr., 1883. 15+204 p. 8°.

THE author, in the introduction to this manual, expresses himself in sympathy with the views advanced by Arnold and Bell on previous occasions, that all persons connected with the prosecution of the dairy business should strive to make themselves familiar with the principles on which success depends. These